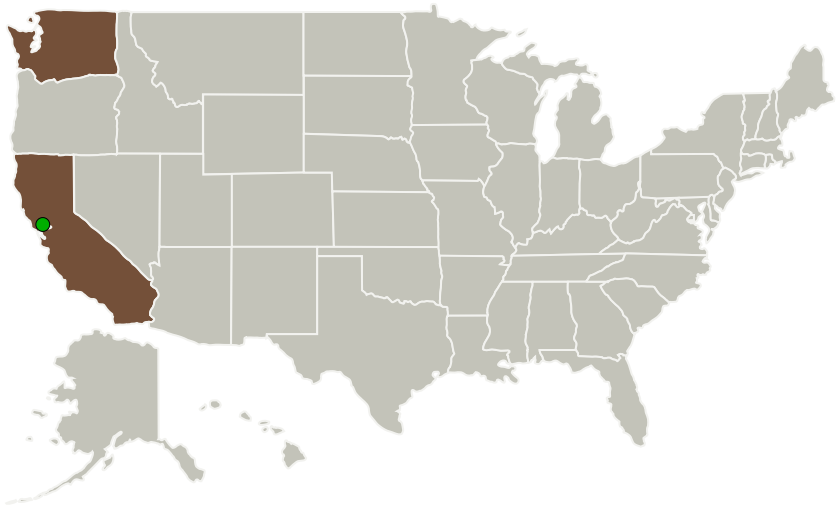
COBRA-Bee Carpal-Wrist Gimbal for Astrobee, Phase I

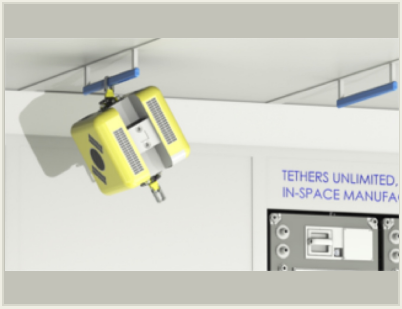
Completed Technology Project (2017 - 2017)

Project Introduction

TUI proposes to develop a carpal-wrist gimbal payload for the Astrobee free-flier, called 'COBRA-Bee' to satisfy Astrobee mission needs for a lightweight, integrated end-effector/tool/sensor positioning and pointing system. The COBRA-Bee is an evolution of TUI's high-TRL, 3-DOF COBRA gimbal that will provide Astrobee end-effectors with the workspace dexterity of a full robotic manipulator (6-DOF via Astrobee fan system + 3-DOF via COBRA-Bee). COBRA-Bee will support target acquisition and tracking experiments for high performance optical communication. It can also support sensors which have limited field-of-view, such as cameras, as well as sensors/end-effectors requiring high pointing accuracy and/or independence from spacecraft attitude control. The 3-DOF (azimuth, elevation, and extension) of COBRA-Bee will support Astrobee experiments with pushing operations for fanless microgravity mobility. COBRA-Bee will provide this precise multi-purpose pointing and positioning capability in a small-scale tightly integrated COTS product, with an interface to support third-party sensors, end-effectors, and tools. The Phase I effort will define requirements for a detailed design, based upon a crew safety analysis and a survey of candidate Astrobee end-effectors. A demonstration will be performed with existing COBRA hardware, maturing the COBRA-Bee TRL to 4. The Phase II effort will develop, test, and deliver an engineering unit and control software.

Primary U.S. Work Locations and Key Partners





COBRA-Bee Carpal-Wrist Gimbal for Astrobee, Phase I Briefing Chart Image

Table of Contents

COBRA-Bee Carpal-Wrist Gimbal for Astrobee, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Washington

Images

Briefing Chart Image
COBRA-Bee Carpal-Wrist Gimbal for Astrobee, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/128985)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Tethers Unlimited Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

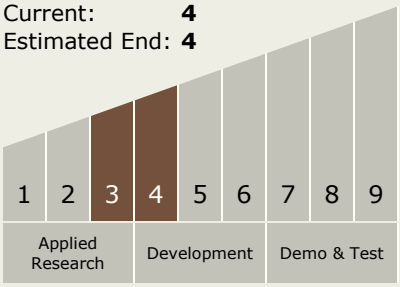
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Nathan Britton

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



COBRA-Bee Carpal-Wrist Gimbal for Astrobee, Phase I

Completed Technology Project (2017 - 2017)

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.1 Dexterous Manipulation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System